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ABSTRACT

Described are the formative evaluation procedures used to assess materials to teach educable mentally retarded children concepts and skills in the areas of money, measurement, and time. It is explained that "formative" evaluation refers to assessment of an instructional product during its development, in order to identify ways in which the materials can be modified. Four stages of the overall project evaluation plan are outlined. Aspects of the formative evaluation design focused on include the six instructional variables assessed, such as instructional effectiveness, the sources of input, such as a teacher review board. Appended is a sample evaluation form for teacher use. (LS)

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THE FORMATIVE EVALUATION DESIGN OF THE VOCABULARY DEVELOPMENT PROJECT

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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

The Formative Evaluation Design of the Vocabulary Development Project[1]

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The evaluation of materials used in the classroom is an important educational responsibility which is frequently ignored. Cronbach (1963) has defined educational evaluation as "the collection and use of information to make decisions about an educational program." This general definition has been the basis for several evaluation endeavors over the past decade. Generally, however, these evaluation attempts have been concerned only with verifying the effectiveness of the final version of an educational product. Evaluation attempts during the development stage have been relatively rare.

Scriven (1967) has made a distinction between two types of evaluation models - "formative" evaluation and "summative" evaluation. "Formative" evaluation refers to the assessment of an instructional product during its development. Its goal is to identify the ways in which the materials can be modified in order to optimize their effectiveness before the summative evaluation is undertaken. "Summative" evaluation refers to the assessment procedures occurring after the development of the instructional product has been complete. According to Scriven, summative evaluation is based upon the final product's use in a field-test situation, where its worth is compared to other products which attempt to accomplish similar goals.

Both the formative and summative aspects of evaluation are necessarily important in the assessment of educational materials. The need for product evaluation to protect school children, the "largest single group of unprotected consumers," has been noted by Cass (1973). Too often such children are required to learn from materials that have not been field-tested. Educational Products Information Exchange Institute (1972) has estimated that 99% of the materials used in schools have not been field-tested in a way that involves the actual use of the materials in the classroom, assessment, and subsequent systematic revision where needed (Cass, 1973). The need for more of this type of formative evaluation has been emphatically proposed by Sanders and Cunningham (1973), who argue that it is the most urgent need in the area of product development.

Recently, materials were developed by the Vocabulary Development Project to teach educationally handicapped children important concepts and skills in the areas of money, measurement and time. In evaluating the materials, the Project observed Scriven's (1967) distinction between formative and summative evaluation, and employed an expanded four-stage overall evaluation plan which included both types of evaluation. The overall evaluation plan included a chain of activities ranging from basic research to the application of this research in the development process; the pilot-testing of initial materials, with feedback from a wide-range of sources; revision of the materials; and finally, a large-scale field-test of the revised materials.

Perhaps the most intensive aspect of this overall evaluation plan involved the formative evaluation of the materials as they were developed. The goal of the formative evaluation of each instructional unit was to modify the materials in order to optimize their effectiveness for educable mentally retarded (EMR) children, the population for whom the Program was developed. The success of the revised materials was to be assessed in the extensive summative evaluation of the materials, which was to occur in urban, rural, and suburban communities in the state of Minnesota.

Each of the five units in the Money, Measurement and Time Program underwent extensive formative evaluation so that revisions could be made and tested in a summative evaluation design. The purpose of this paper is to explain how the formative evaluation design was incorporated into the overall evaluation plan of the Vocabulary Development Project, and specifically, to describe the formative evaluation design in detail so that others might develop a similar evaluation plan to meet their own needs.

Overall Evaluation Plan of the Vocabulary Development Project

The goal of the overall evaluation plan of the Vocabulary Development Project was to identify effective instructional techniques and to incorporate these into materials which would meet some of the instructional needs of young EMR children. An overall evaluation plan which incorporated each of these goals was developed. It was the belief of the Project that evaluation would not only

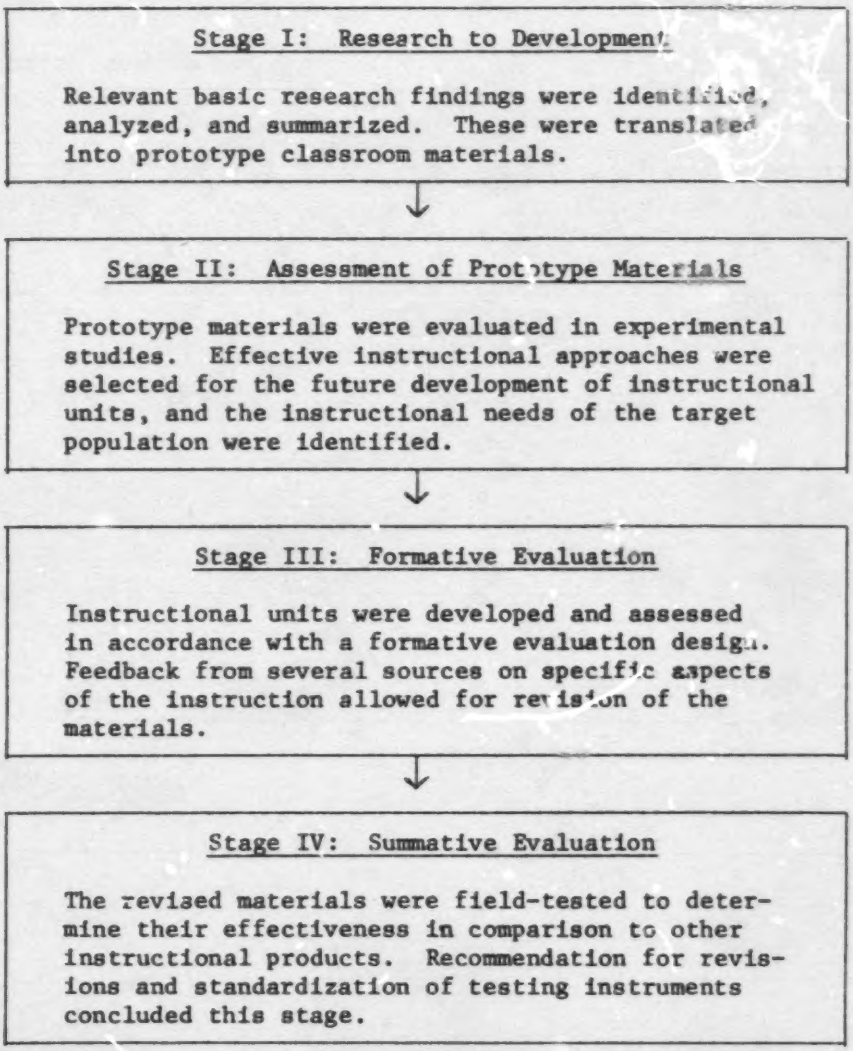
facilitate the process of instructional development, but that it would also prove to be an integral part of that process.

Four stages were identified in the Project's overall evaluation plan (see Figure 1). Stage One involved the movement from "research to development." In this stage, relevant findings from basic research were identified, analyzed, and summarized, and then translated into prototype classroom materials. Much of the research foundation came from elaboration research conducted by the Project's directors (cf., Taylor, Josberger, & Knowlton, 1972; Thurlow & Turnure, 1972; Turnure, 1971; Turnure & Thurlow, 1973a,b; Turnure & Walsh, 1971; Whitely & Taylor, 1973) and from other research being conducted at the University of Minnesota's Research, Development and Demonstration Center (cf., Bender & Taylor, 1973; Danner & Taylor, 1973; Riegel Danner & Taylor, 1972). Relevant findings from numerous other individuals working in the area of elaboration were also reviewed and incorporated during this stage (cf., Ammon & Ammon, 1971; Bower, 1970; Rohwer, 1970). It was in this initial stage that prototype materials were written by taking the findings from basic learning strategies research and translating them into materials to be used in the classroom. The role of the evaluator during this preliminary stage was to clarify and refine the objectives of the materials, making explicit the underlying rationale.

Stage Two involved the assessment of the prototype materials in the classroom. Several "experimental" studies contributed to this stage of the Project's overall evaluation design (cf., Bender,

Figure 1

Overall Evaluation Plan of the Vocabulary Development Project


Stage I: Research to Development
Relevant basic research findings were identified, analyzed, and summarized. These were translated into prototype classroom materials.
Stage II: Assessment of Prototype Materials
Prototype materials were evaluated in experimental studies. Effective instructional approaches were selected for the future development of instructional units, and the instructional needs of the target population were identified.
Stage III: Formative Evaluation
Instructional units were developed and assessed in accordance with a formative evaluation design. Feedback from several sources on specific aspects of the instruction allowed for revision of the materials.
Stage IV: Summative Evaluation
The revised materials were field-tested to determine their effectiveness in comparison to other instructional products. Recommendation for revisions and standardization of testing instruments concluded this stage.

Taylor, Riegel, & Turnure, 1972; Riegel & Taylor, 1973: Riegel, Taylor, Clarren, & Danner, 1972). In particular, one "experimental" study compared alternative instructional approaches for teaching vocabulary, and evaluated the children's instructional needs in light of the limitations of each approach. The details of this study, which perhaps contributed most directly to the development of the Money, Measurement and Time Program, are described fully in Taylor, Thurlow, and Turnure (1974), along with the rationale for the decision to develop a program of instruction on money, measurement and time concepts.

Stage Three involved the development of the first version of the Money, Measurement and Time Program (initially referred to as the "Math Vocabulary Project;" cf., Taylor, Thurlow, & Turnure, 1973), the pilot-testing of the materials, and their revision. This stage represented the formative evaluation of the materials. As each unit was developed, it was tested in several classrooms (from four to six) of EMR children. During this stage, there was maximal interaction between the developers and the classrooms using the materials. Teachers assessed the materials daily on teacher evaluation forms, observers visited the classrooms, and the children were tested frequently throughout the instruction. The careful monitoring of the materials, with the immediate feedback from teachers, observers, and test results enabled the materials developers to quickly and efficiently revise and modify each unit. In the development of the Money, Measurement and Time Program, this stage

of formative evaluation was perhaps the most important since the developers were gathering data about the product's effectiveness for the specific purpose of making major revisions where weaknesses were observed.

Stage Four involved the field-testing of the revised materials on a relatively large-scale, with minimal interaction between the developers and the classrooms. During the Stage Four field-test, the performances of groups receiving the Money, Measurement and Time Program were compared to those of "Hawthorne" control groups. In addition, the effectiveness of the Money, Measurement and Time Program was compared with that of materials typically used by the teachers (often these included materials developed by the teachers themselves) in their EMR classrooms. The goal of the evaluator during this stage was to standardize the testing instruments, to examine the attainment of objectives, and to document pretest to posttest gains. This stage, referred to as the summative evaluation by the Vocabulary Development Project, differed in two respects from the "summative evaluation" described by Scriven (1967). First, the product was not assessed in comparison to a specific alternative product that attempted to accomplish similar goals. The decision to delete this aspect was made by Project Directors after failing to find an appropriate alternative product which covered the same range of content as the Money, Measurement and Time Program. Second, because the Money, Measurement and Time Program had not yet gone to a publisher, it was still possible to make recommendations for changes

before publication of the final product.

The present paper is a discussion of Stage Three of the overall evaluation plan. This stage involved the formative evaluation of each of the instructional units which had been produced on the basis of the first two stages in the overall plan. Five instructional units underwent formative evaluation: Money, Measurement of Length, Measurement of Weight, Time with the Clock, and Time with the Calendar (cf., Thurlow, Taylor, & Turnure, 1973). The basic design of the formative evaluation for each of the units was the same.

Formative Evaluation Design of the Vocabulary Development Project

As indicated previously, the goal of the formative evaluation design was to evaluate the materials as they were being developed - so they could be modified in a way that would optimize their effectiveness and useability. The ideal was to obtain "rich," but cost-effective information about the materials. It was hoped that the results of the evaluation would be "expository," as described by Stake (1967):

> A full evaluation results in a story, supported perhaps by statistics and profiles. It tells what happened. It reveals perceptions and judgments that different groups and individuals hold--obtained, I hope, by objective means. It tells of merit and shortcoming....[p. 5].

Thus, opinions of various individuals, as well as hard data, were considered to be a crucial part of the evaluation design.

The formative evaluation design involved a matrix of input

sources and instructional variables (see Table 1). Each source of input (e.g., classroom observation) was used to assess one or more variables (e.g., effectiveness, content, design).

For the Money, Measurement and Time Program, six instructional variables were identified as most germane to the success of the units in the Program. These were: 1) Instructional effectiveness, 2) Sequencing, 3) Content, 4) Design of the materials, 5) Need for the instruction, and 6) Adequacy of testing procedures.

Instructional effectiveness involved the assessment of the subjects' mastery of the objectives specified for the instruction. Where instruction was found to be ineffective or weak, close scrutiny of the associated instructional techniques, sequencing, and the design of the materials was undertaken, in addition to the investigation of the specific content itself. The goal of 80% mastery by posttesting was set up as the criterion during pilot-testing. Instructional effectiveness was primarily determined by the analysis of data from tests given during instruction and from posttests. A secondary rating of instructional effectiveness was obtained from teacher feedback and classroom observation feedback.

Sequencing of the instruction referred to the flow from one lesson to the next, from one concept or skill to the next, and from one step in the development of a particular concept or skill to the next step. Sequencing in the initial version of each unit was determined primarily by a process Stake (1970) has labeled "logical analysis." In other words, sequencing was based on the

Table 1

The Formative Evaluation Design: A Matrix of Input Sources and Instructional Variables

Sources of input	Instructional effectiveness	Sequencing	Content	Design of materials	Need assessment	Field test procedures
	Instructional Variables					
Project personnel						
1. Project directors		**	**	**	*	**
2. Developers and technical writers		**	**	*		
3. Outside Consultants		**	**	*	**	*
Teacher Review Board						
1. Unit summary meeting	*	**	**	*	**	
2. Written evaluations	*	*	*	*		
Classroom Observations	*		*	*		
Data Analysis						
1. Diagnostic pretest		**	**		**	*
2. Progress test during instruction	**	*			*	*
3. Posttest results	**				*	**
Other research & instructional materials				**	**	

** Indicates that the source was a very important input assessing the instructional process.

* Indicates that the source was an important input for assessing the instructional process.

feelings and knowledge of the Project directors and the materials developers. The formative evaluation process thus served to verify the sequence or provide a rationale for revising it.

A major quantitative method by which sequencing was ascertained during the formative evaluation was order analysis (Krus, 1973, 1974; Krus & Bart, 1974; Taylor, Bart, & Howe, 1974). Order analysis of the posttest items, for instance, sequenced them according to the order in which students obtained mastery of them. Tree-like structures of the items leading to the most difficult item showed the paths and order in which instruction on the objectives should be presented for optimal learning.

Content referred to the "substance" of the instruction. It included, for example, the behavioral objectives, the specific words and skills, the pictures and wordings, and the tape-recorded voices which were used during the instruction.

The behavioral objectives were, of course, a major factor considered under content. Achievement related to all specified objectives, plus some incidental ones, was tested. In addition, personal judgments by teachers, consultants, and project personnel regarding all objectives were also considered. Using as many sources of input as possible, the evaluation design was set up to determine whether the objectives (and the higher-order purpose) for each lesson were: 1) appropriate for the children, 2) consistent with the instruction, 3) the most important for the lesson, and 4) clearly stated.

In the present evaluation design, "content" also referred to

the words and skills presented, and the instructional techniques used to present them. The initial selection of words and skills was made on the basis of needs assessment, and presentation within the instruction reflected the notion of the "growth of meaning." In other words, each vocabulary word was expanded to encompass more and more meaning, and eventually related skills were introduced. For example, in the Money Unit, each of the U.S. coins was presented three times to develop three expansions of meaning (recognition, relative value, exact value). The formative evaluation procedures were designed specifically to assess this growth of meaning in the content, and especially the inclusion of concepts needed before children could adequately proceed in the instruction (e.g., the need for prerequisite concepts like "more" and "most" before the presentation of relative value).

Every aspect of content was assessed during the formative evaluation, and resulted in, perhaps, the most extensive amount of information collected concerning the materials being developed.

Design of the materials related to the general format used to present the instruction. Useability by both the children and the teachers was considered. For example, the use of tape recorded lessons, variations in the types of tape lessons, the frequency or location of "stop tapes" and "pauses" during tape presentations, and the size of the children's texts were just some of the aspects investigated in terms of useability and effectiveness for the children. The format of teacher's editions, the use of

step-by-step teacher-directed activities, and the inclusion of optional post-activities were a few of the factors considered in teacher useability. The design of the materials was evaluated primarily by the input from those who used the materials and those who developed them.

Need for the Program was assessed prior to the initial development of the Money, Measurement and Time Program, and also during formative evaluation. A search of published instructional materials was conducted to determine the need for the Program. This search failed to identify any relevant programs (i.e., ones that provided instruction in the target content areas) that did not require entry skills such as reading and computation. Relevant materials were found to make assumptions about the child's entry level abilities, abilities which exceeded those of most educationally handicapped children. During formative evaluation, pretest data, as well as the input from teachers and a qualified math consultant, made it possible to more effectively document the need for instruction.

Field-testing procedures were established on the basis of feedback from the formative evaluation. Although the repeated testing of objectives was an important aspect of the formative evaluation, this procedure was judged unnecessary and expensive for final field-testing of the materials. Therefore, the data from the formative evaluation (including data analysis and teacher feedback) were used to construct an efficient and cost-effective test for each unit. Other improvements in field-test procedures which

were the goal of the formative evaluation were: 1) the summarization of the test results in a concise and useable form for the teachers, 2) the development of a short diagnostic placement test that could be administered by teachers, and 3) the analysis of transfer tests of highest potential payoff for the forthcoming summative evaluation.

The six instructional variables discussed above were specific to the materials in the Money, Measurement and Time Program, although other materials certainly have similar instructional variables which could be evaluated. In order to adequately evaluate the instructional variables during the development of materials, five basic sources of input were identified and established by the Vocabulary Development Project (see Table 1). These input sources included: 1) Project personnel, 2) Teacher Review Boards, 3) Classroom observations, 4) Data analyses, and 5) Other research and instructional materials.

Project personnel included project directors, writers of the instruction, and outside consultants. The project directors were individuals who had been involved in both Stage One and Stage Two of the overall evaluation plan. The feedback from these individuals, based on their composite view of the data from other input sources, was viewed as a major source of input to each of the six instructional variables, except the analysis of instructional effectiveness.

The writers of the instruction were responsible for developing and revising the actual instructional materials. They were individuals who had been teachers of the target population, young EMR children, before being hired for the project. These individuals had been

identified as particularly effective with these children, and had demonstrated an ability to write satisfactory materials based on the general guidelines and technical specifications set up by project directors. The feedback from the writers was viewed as especially pertinent to the implementation and evaluation of sequencing, content and design of materials.

Outside consultants were employed whenever possible to provide an "unbiased" source of feedback. Such individuals had academic and practical expertise with the content areas or with the target subject population (EMR children). To avoid the problems often encountered with "expert" opinions (cf., Armstrong, 1973; Dershimer, 1968), the Vocabulary Development Project provided the outside consultants with a list of the instructional variables of interest, along with a statement of the Program's purpose (cf., Taylor, Thurlow, & Turnure, 1973). The feedback from the outside consultants was used to evaluate the need for the program, as well as its sequencing, content, design, and evaluation procedures.

The Teacher Review Board was an important feedback element set up to obtain maximal input from those individuals using the materials. The importance of including the teachers in the process of evaluation, especially formative evaluation has been noted by McLaughlin (1973). Not only is the teacher the main "consumer" of the materials being evaluated, but the teacher has access to certain forms of data neither obtainable by testing nor visible to the classroom observer. Although the need for teacher evaluation is obvious, the best instruments for obtaining such evaluations are not. Two methods were used to obtain

feedback from teachers using the Money, Measurement and Time materials: 1) Written evaluations, and 2) Unit summary meetings.

A separate Teacher Review board was set up for each unit that underwent formative evaluation. Teachers were requested to participate and were informed of their responsibilities (e.g., to teach the unit daily, to provide weekly lesson plans, to fill out evaluation forms, to allow for testing and classroom observations, and finally, to attend a meeting following completion of the unit). Teachers were modestly paid for completing the teacher evaluation forms and for attending the final Teacher Review Board meeting. Each teacher participating in the pilot-test was given an evaluation form for each lesson in the unit being tested. These very detailed questionnaires (see Appendix 1) covered nearly every aspect of the instruction (e.g., content, preparation time, pictures, etc.), and were generally about ten pages in length. Thus, a great deal of data was amassed from the teacher's written evaluations.

Fortunately, one of the problems often encountered with the use of teacher evaluation forms (the noncompletion or nonreturn of forms; cf., Latham, 1973) was rarely encountered under the present formative design, despite the relatively lenghly evaluation forms used. This was due, in part, to the practice of paying teachers for completing the forms. (Teachers were <u>not</u> paid for using the materials.) More important, however, was the fact that the teachers were shown the ways in which their written reactions were important and how they formed a major source of input for the revision of the materials (cf.

arrangements, time of day, number of children, etc.).

The classroom observations were also used, of course, to provide additional feedback on the effectiveness of the instruction. In all cases, attempts were made to conduct observations when weaknesses or problems were noted by the teachers, or when Project personnel desired feedback on a specific lesson or activity.

Data analyses were a major source of input in the formative evaluation design, especially for identifying areas where other aspects of instruction (e.g., content, sequencing, etc.) should undergo further scrutiny. Data collected during formative evaluation included pretest data, posttest data, and data from tests given while instruction was in progress.

Pretest data were used to determine initial placement in a unit about to undergo formative evaluation. In all cases, teachers were informed of the pretest performances of all children in their classes so that they would know where strengths and weaknesses were. The main purpose of the pretest data, however, was to provide a baseline for assessing performance levels after instruction.

During instruction, "post-lesson" tests were given frequently (after every two to three lessons) to assess mastery on various objectives as relevant instruction was presented. These tests were used mainly to determine the immediate "worth" of the lessons (i.e., whether or not the objectives of a given lesson were met immediately after the instruction from that lesson was presented). If 80% mastery was not demonstrated on a given objective on a "post-lesson" test,

it was then included in the next "post-lesson" test to ascertain if later instruction affected performance. In addition, these tests frequently included questions related to objectives not yet taught. This was done in order to determine any "transfer" that instruction might have to performance on future objectives. Again, teachers were informed of "post-lesson" performances so that they could modify instruction to cater to the strengths and weaknesses revealed.

Posttesting was conducted at the completion of all instruction. All items were presented during the posttest to identify the "final" effects of the instruction (including any drop-offs in performance after initial mastery).

Since the instruction undergoing formative evaluation was designed to avoid making assumptions about the children's ability levels, each objective in the instruction was tested two or three different ways to insure accurate measurement (Bart, personal communication). This concurs with Dershimer's (1968) argument that evaluators should use more than a single measure in order to obtain richer data. Thus, in the formative evaluation described here, specific purposes of the instruction (e.g., to "know" about the U.S. coins) were tested in several different ways (e.g., identify a coin when with others; name coin when by itself; describe coin not in view; utilize name of coin in a sentence, etc.). In some cases, the tests included questions related to items not specified in the instruction. These were generally ones the teachers or project directors had identified as important or ones which the instruction might influence although not specifically being taught.

Data collected during the formative evaluation of a particular unit were summarized by project directors and assembled into a document which made specific recommendations about all aspects of the instruction, except the design of the materials (see Table 1). These recommendations not only described where instruction was weak, but also identified possible reasons and other sources to investigate before making any revisions.

Other research and instructional materials were continually reviewed during the formative evaluation of the Money, Measurement and Time Program. These outside sources were valuable in the continuing evaluation of the need for the instruction and in providing ideas for revising the format and design of the materials.

Adoption of the Formative Evaluation Design

During the implementation of the formative evaluation design of the Vocabulary Development Project in real-life classroom settings, the specific sources of input and procedures for obtaining feedback were sometimes modified to conform to budget and time requirements. Amazingly, however, the "ideal" design was followed relatively closely in the formative evaluation of all five units in the Money, Measurement and Time Program (cf., Krus, Thurlow, Howe, Taylor, & Turnure, 1974; Thurlow, Krus, Howe, Taylor, & Turnure, 1974 a,b,c). The proposed matrix of input sources and instructional variables proved to be most effective and efficient for conducting formative evaluations.

Perhaps the one aspect of this formative evaluation design which made it so successful was the extensive interactions that took

place between the various input sources, and the valuable composite picture of the materials. For instance, during the Teacher Review Board meetings, the pilot-test teachers freely discussed their reactions to the materials, even when project personnel indicated that they did not agree with the teachers. The completeness of the test data, and the fact that feedback about the data was always given to the teachers, allowed the teachers to search for reasons, either in their teaching methods or in the instruction itself, for the good or poor performances of the children in their classes. Project personnel frequently made classroom observations, and were always aware of the current status of the materials in the classroom. Although the matrix depiction of the formative evaluation design does not reflect the varied and numerous interactions which occurred, they were extremely important to the success of the evaluation plan.

Although the formative evaluation design presented here was developed specifically for the Vocabulary Development Project to evaluate and revise the vocabulary materials it was developing, the design seems to be one which could be easily adopted by any project seeking to engage in formative evaluation.

The specification of the instructional variables of interest, of course, would vary with the product being evaluated. General factors, such as sequencing, content, design of the materials, instructional effectiveness, testing instruments, and needs assessment seem to be non-specific enough to apply to almost any instructional product. The definition of these variables and the further delineation of them (e.g., what does "content" encompass), however, would depend upon

the specific instructional product being evaluated. For example, since the Money, Measurement and Time Program was concerned with vocabulary development, investigation of word content was crucial to the revision. Needless to say, relevant instructional variables should be specified regardless of the specific evaluation plan being implemented.

The sources of input proposed in the present formative evaluation design seem to be especially effective, and applicable to almost any project engaged in the development and evaluation of an instructional product. Classroom observations, opinions from pilot-test teachers and project personnel, data analysis, and the continued assessment of related research and instructional materials are sources available to any developmental endeavor. The extensive use of these sources and the attempt to provide opportunities for interactions between them appeared to be the key to the success of the formative evaluation design described here.

Systematic and frequent classroom observations provide an "outside" view of what is actually happening in the class (i.e., how the instruction is being implemented). Such observations can also contribute to the rapport between pilot-test teachers and project personnel. The inclusion of developers and project directors in the panel of classroom observers insures immediate feedback from teachers, and two-way communication between the teachers and the project personnel. Of course, classroom observations also allow for the immediate identification of problems in the instruc-

tional materials.

Teacher judgments are generally seen as an important factor in the evaluation of instructional materials, yet the procedures for obtaining these have been relatively ineffective (cf., Latham, 1973; McLaughlin, 1973). The promotion of a high degree of teacher involvement appears to be crucial to insuring the effectiveness of this input source (cf., Baum, 1974). In the implementation of the present formative evaluation design with the Money, Measurement and Time Program, the establishment of teacher involvement insured that in 97% of the cases, evaluation forms were completed and returned. In addition, the Teacher Review Board meetings insured that all teacher feedback would be obtained, and that any responses to the evaluation forms which were not understood could be clarified. Furthermore, the Teacher Review Board meetings opened important communication channels between the teachers, project directors, and the individuals responsible for revising the instruction. This procedure resulted in the compilation of a relatively final summary of the teachers' recommendations for the instructional product being evaluated.

Project personnel can be involved in all phases of the evaluation process. Their opinions, influenced by interactions with the other input sources, should be an important input source to any project engaging in formative evaluation. All project personnel can participate in classroom observations, and should continually monitor the progress of the pilot-test by investigating up-to-date teacher evaluation forms, by talking to the pilot-test teachers, and by considering the results of data analyses.

Although most attempts at evaluation involve data analysis, the data collected during formative evaluation should be extensive enough to continually reassess the progress of instruction. The use of pretesting and posttesting on all relevant objectives is essential. Furthermore, the use of more than one measure to evaluate performance is suggested (cf., Dershimer, 1968). Frequent testing appears to be a highly effective procedure for continually assessing the progress of instruction, as well as for identifying forgetting effects that the instruction must compensate for and transfer effects upon which the instruction can build. In the implementation of the formative evaluation design by the Vocabulary Development Project, this procedure allowed for the compilation of test-inferred recommendations for revision, a document which was extremely valuable during the actual revision of materials.

The formative evaluation design proposed by the Vocabulary Development Project is an extensive one which is somewhat time-consuming. Yet, the design and the implementation of it appear to be extremely worthwhile in terms of the amount and nature of information obtained. Any project which successfully implements the formative evaluation design can expect to obtain the information necessary for a valid and relatively final revision of the instructional product subjected to the evaluation.

Although the purpose of the present paper was to describe the formative evaluation design of the Vocabulary Development Project, the details of the specific instruments and procedures have not been included here. Reports on the formative evaluation of each unit (cf., Krus, Thurlow,

Howe, Taylor & Turnure, 1974; Thurlow, Krus, Howe, Taylor, & Turnure, 1974 a,b,c) provide more detailed information (e.g., test questions, observation forms, etc.), and reports on the summative evaluation of each unit (cf., Krus, Thurlow, Taylor, & Turnure, 1974 a,b,c,d) demonstrate how the formative evaluations resulted in improvements in field-test procedures.

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Footnotes

[1]The formative evaluation design of the Money, Measurement and Time Program took many months to conceptualize and even longer to describe for others planning to do formative evaluation. Although gratitude is due to all those who participated with the Vocabulary Development Project when in the process of formative evaluation, special thanks are due to Jenny R. Armstrong and Donald Hubbard from the University of Wisconsin at Madison.

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Appendix 1

SAMPLE TEACHER EVALUATION FORM

TIME WITH THE CLOCK
Book Two

Teacher_____

School_____

Lesson # 2 Title Telling Time... Half Hour Date_____

Purpose, Behavioral Objectives, Lesson Outline, and Materials Needed

Purpose and Behavioral Objectives

Were the purpose and objectives stated clearly enough for you to understand the goal of the lesson?

	None	Some	Most	All
For how many children in your class were the purpose and objectives appropriate?	( )	( )	( )	( )
How many children did you feel had reached the objectives before the lesson was presented?	( )	( )	( )	( )

Lesson Outline

Did the lesson outline help you in planning the use of the lesson activities and the tape presentation?

How could it be improved to be more helpful to you?

Materials Needed

Were you able to obtain the materials that were required?

Did you feel any of the required materials should have been provided?

Lesson #____

Pre-Activity

This pre-activity was designed to be structured for you.

	Yes	No	Unsure
Was it helpful for the activity to be as structured as it was?	( )	( )	( )
Was the activity structured enough?	( )	( )	( )
Were the steps in the activity clear? Could you see the rational behind the steps?	( )	( )	( )

Are there any ways in which you would change the structure of the activity?

	None	Some	Most	All
How many children in your class did you feel <u>needed</u> the pre-activity?	( )	( )	( )	( )
Of the children who needed the pre-activity, how many benefitted from it?	( )	( )	( )	( )

What was the effect of the pre-activity on those children who you felt did not need the pre-activity?

How long did it take your class to complete the required pre-activity?

Was the Pre-activity sufficiently explained so that you could direct it without difficulty?

Are there any other activities which you feel should be included as pre-activities?

Lesson #_____

Tape Presentation

	Yes	No	Unsure
Did the pre-activity adequately prepare your class for the tape presentation?	( )	( )	( )

Introductory Relation

	Yes	No	Unsure
Did the introductory relation interest the children and get them to look at the cover picture?	( )	( )	( )
While looking at the cover picture, did the children attend to what was said?	( )	( )	( )
Did you feel the cover picture was appropriate for the introductory relation and the tape presentation as a whole?	( )	( )	( )
Did the introductory relation succeed in preparing the children for what the lesson was designed to teach them?	( )	( )	( )
Did the introductory relation prepare <u>you</u> for the tape presentation?	( )	( )	( )

Presentation of Words

	Yes	No	Unsure
Were the words presented in the best possible order?	( )	( )	( )

	Always	Sometimes	Not Usually
Did you feel there was a smooth flow from one word to the next in the tape presentation?	( )	( )	( )

(<u>Definitions</u>): Following the tape presentation, did you feel the children had obtained definitions for each of the words presented in the tape?

( ) Yes ( ) No

List each word in the lesson and the type of definition you feel most of the children in your class obtained for that word (i.e., none, rote, non-generalizable, functional, etc.).

(Elaborations): Overall, were the elaborations (stories), distracting, or helpful to the children?

( ) Helpful ( ) Distracting ( ) Neither

List any elaborations which you felt were especially superior or inferior.

(Relations): Did you feel the children understood the relationship between the words by the end of the tape presentation?

( ) Yes ( ) No ( ) Unsure

Do you think the Summary Relation at the end of the tape presentation played a significant role in insuring that the children understood the relationships?

( ) Yes ( ) No ( ) Unsure

Is there any form (e.g., story, questions, physical activity) that you think would have made the Summary Relation more effective or interesting?

List the numbers of the pictures and/or worksheets used during the tape presentation and describe their appropriateness (e.g., very good, adequate, distracting, inappropriate, unnecessary).

How long did it take your class to complete the tape presentation?

Lesson #_____

Post-Activities

(General Comments):	Yes	No	Unsure
In general, did you feel that the post-activities strengthened the concepts developed in the tape presentation?	( )	( )	( )
Were the post-activities sufficiently explained so that you could direct them without difficulty?	( )	( )	( )
Were the post-activities sequenced in the best way? (If not, how would you sequence them?)	( )	( )	( )

Are there any other activities that you feel should be included in the post-activities?

(Specific Comments): A number of post-activities were suggested to you. Please list each activity you used by kind (Required or Optional) and number, and give your opinion of the activity and how you think it might be strengthened (include, if possible, the amount of time spent on each activity). It is important that we get your specific comments on <u>every</u> activity that you have used. Feel free to use as much paper as necessary.

Lesson #____

General Comments on the Lesson

Please look at the page in your Teacher's Manual which shows the vocabulary words for the unit (page ii). Note the position of this lesson within the unit.

	Yes	No	Unsure
Does this chart help you to understand the place of this lesson in the whole sequence of the unit?	( )	( )	( )
Do you feel that the children in your class are now educationally and motivationally ready for the next lesson in the unit?	( )	( )	( )
Are there any words that you think the children should have been taught prior to this lesson? If yes, what are they?	( )	( )	( )
At this point, do you agree with the ordering of the lessons?	( )	( )	( )

If not, how would you change the sequence of the lessons (or, is there a lesson not included here that you feel is needed and should be inserted before this lesson?).

Look at the purpose and behavioral objectives for the lesson. Did the activities and tape presentation of the lesson meet these objectives?

How many children did you feel knew the vocabulary concepts at the end of the complete lesson?

( ) None ( ) Some ( ) Most ( ) All

Did the children enjoy the lesson?

What aspect of the lesson was most popular?

What aspect of the lesson was least popular?

Are there any changes or additions you would recommend to enhance the children's enjoyment and/or learning without distracting from the lesson?

If you had to pick the one aspect of the lesson which you felt was the most important in insuring that the children learned the concepts presented, what would you select in this lesson?

How much actual time did you spend on this lesson?

Total number of days? _____

Approximate total amount of time? _____

What was your feeling about the length of this lesson?

( ) Too long ( ) Too short ( ) About right

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University of Minnesota Research, Development and Demonstration
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